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IS 9965 (1981): Limits of sizes for ISO metric external screw threads for high temperature applications [PGD 20: Engineering Standards]

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Indian Standard (Reaffirmed 2003)

LIMITS OF SIZES FOR ISO METRIC EXTERNAL SCREW THREADS FOR HIGH TEMPERATURE APPLICATIONS

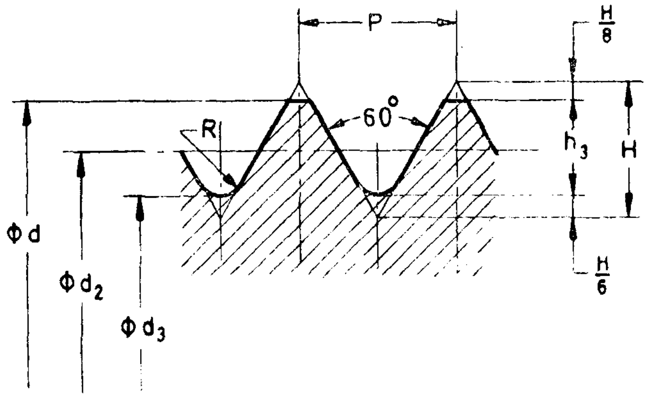
Screw Threads Sectional Committee, EDC 70 [Ref: Doc: EDC 70(3423)]

1. Scope — Specifies the limits of sizes for ISO metric external screw threads for high temperature applications. The basic profile is as specified in IS : 4218 (Part I)-1976 ' ISO metric screw threads : Part I Basic and design profiles (*first revision*) '.

Note — The large clearances specified in the standard are suitable for applications involving a medium temperature above 300°C and below 575°C.

1.1 External screw threads covered in this standard shall be used with internal screw threads of tolerance class 7H covered in IS : 4218 (Part IV)-1976 ' ISO metric screw threads: Part IV Tolerancing system (*first revision*) '.

2. Profile of External Screw Threads — The design profile of external screw threads shall be as given in Fig. 1.



$H = 0{\cdot}866\,03\,P$

$h_3 = 0{\cdot}613\,43\,P$

$d_2 = d - 0{\cdot}649\,53\,P$

$d_3 = d - 1{\cdot}226\,87\,P$

$R = 0{\cdot}144\,34\,P = \frac{H}{6}$

FIG. 1 DESIGN PROFILE OF EXTERNAL THREADS

3. Limits of sizes for external threads shall be as given in Table 1 read with Fig. 1.

4. Designation — ISO metric external threads for high temperature applications shall be designated as follows with letter T to indicate its suitability for high temperatures.

4.1 An external thread of nominal size M30 shall be designated as:

M30 — T IS : 9965

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TABLE 1 LIMITS OF SIZES FOR EXTERNAL THREADS

(*Clause* 3 *and* Fig. 1)

All dimensions in millimetres.

Nominal Size	*P*	*R*	**Major Diameter** *d*		**Pitch Diameter** d_2		**Minimum Flank Clearance***	**Minor Diameter** d_3		**Core Area**
		Min	*Max*	*Min*	*Max*	*Min*		*Max*	*Min*	mm² *Min*
M12	1·75	0·18	11·823	11·558	10·686	10·536	0·177	9·676	9·400	69
M16	2	0·20	15·823	15·843	14·524	14·364	0·177	13·369	13·065	133
M20	2·5	0·25	19·800	19·465	18·176	18·006	0·200	16·733	16·383	210
M24	3	0·30	23·788	23·413	21·839	21·639	0·212	20·107	19·691	303
M27	3	0·30	26·788	26·413	24·839	24·639	0·212	23·107	22·691	403
M30	3·5	0·35	29·775	29·350	27·502	27·290	0·225	25·481	25·017	490
M33	3·5	0·35	32·775	32·350	30·502	30·290	0·225	28·481	28·017	614
M36	4	0·40	35·763	35·288	33·165	32·941	0·237	30·856	30·344	721
M39	4	0·40	38·763	38·288	36·165	35·941	0·237	33·856	33·344	870
M42	4·5	0·45	41·750	41·250	38·827	38·591	0·250	36·229	35·669	996
M45	4·5	0·45	44·750	44·250	41·827	41·591	0·250	39·229	38·669	1 171
M48	5	0·50	47·735	47·205	44·487	44·237	0·265	41·601	40·991	1 316
M52	5	0·50	51·735	51·205	48·487	48·237	0·265	45·601	44·991	1 586
M56	5·5	0·55	55·720	55·160	52·148	51·883	0·280	48·972	48·311	1 829
M64	6	0·60	63·646	63·046	59·749	59·469	0·354	56·285	55·573	2 421
M72×6	6	0·60	71·646	71·046	67·749	67·469	0·354	64·285	63·573	3 169
M80×6	6	0·60	79·646	79·046	75·749	75·469	0·354	72·285	71·573	4 017
M90×6	6	0·60	89·646	89·046	85·749	85·469	0·354	82·285	81·573	5 219
M100×6	6	0·60	99·587	98·987	95·690	95·390	0·413	92·226	91·494	6 571
M110×6	6	0·60	109·587	108·987	105·690	105·390	0·413	102·226	101·494	8 095
M120×6	6	0·60	119·587	118·987	115·690	115·390	0·413	112·226	111·494	9 753
M125×8	8	0·80	124·440	123·730	119·244	118.909	0·560	114·625	113·714	10 150
M140×8	8	0·80	139·440	138·730	134·244	133·909	0·560	129·625	128·714	13 000
M150×8	8	0·80	149·440	148·730	144·244	143·909	0·560	139·625	138·714	15 110
M160×8	8	0·80	159·370	158·660	154·174	153·839	0·630	149·555	148·644	17 330
M170×8	8	0·80	169·370	168·660	164·174	163·819	0·630	159·555	158·624	19 720
M180×8	8	0·80	179·370	178·660	174·174	173·819	0·630	169·555	168·624	22 320

*Diameter difference between maximum size of bolt thread and minimum size of nut thread.

EXPLANATORY NOTE

In this standard fundamental deviations required for ensuring an adequate minimum clearance between the bolt thread and the nut thread have been re-defined. At elevated temperatures the fundamental deviations specified in IS : 4218 (Part IV)-1976 may not always prevent seizing of threads. The larger fundamental deviations provided in the standard ensure a minimum flank clearance needed for locked connections with reduced shank. The fundamental deviations specified in the standard are given below with respect to the size ranges:

Nominal Size			*Fundamental Deviation*
M12	to	M56	2·5e
M64	to	M90×6	3e
M100×6	to	M120×6	3·5e
M125×8	to	M150×8	4e
M160×8	to	M180×8	4·5e

With these deviations, it is felt, the minimum flank overlap obtained yields the necessary holding power. The increase in the fundamental deviation with increasing thread diameter also allows preloading to be applied by heating the stud or the stud-bolt.

The above tolerances are suitable for bolted connections with reduced shank. Reduced shank studs and stud-bolts are used in structures which are exposed to alternating forces and varying temperatures like process plants, piping, turbines, etc.

In the preparation of the standard considerable assistance has been derived from DIN 2510 Blatt 2-1971 Schraubenverbindungen mit Dehnschaft, Metrisches Gewinde mit groBem Spiel, NenmeBe und GrensmaBe (Bolted connections with reduced shank; metric thread with large clearance; nominal dimensions and limits) issued by Deutsches Institut für Normung (DIN).